Data Sheet

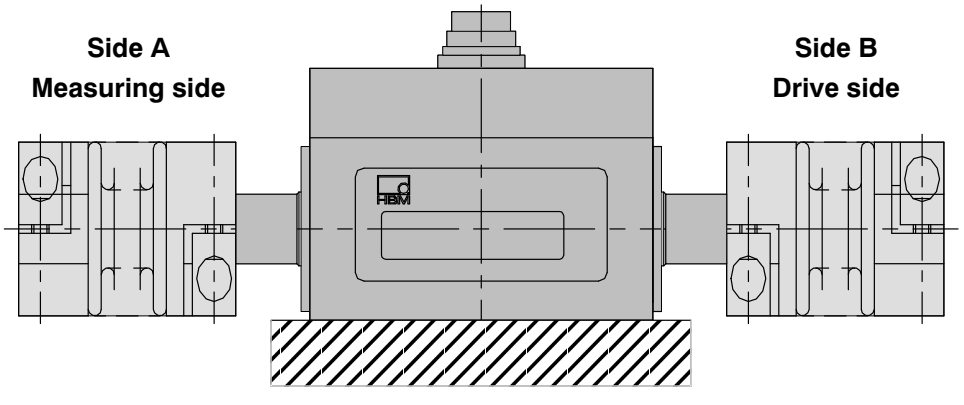
T20WN

Torque transducers

Special features

- **Nominal (rated) torques 0.1 N·m, 0.2 N·m, 0.5 N·m, 1 N·m, 2 N·m, 5 N·m, 10 N·m, 20 N·m, 50 N·m, 100 N·m, 200 N·m**
- **Accuracy class: 0.2**
- **Contactless transmission of measurement signals**
- **Measurement on rotating or stationary parts**
- **Cylindrical shaft ends for non-play friction joints**
- **Integrated measurement system for rotational speed and angle of rotation**
- **Torque output signal ±10 V**

Installation example with bellows couplings



Two of the couplings provided are needed for this example

Specifications – T20WN

Type		T20WN										
Accuracy class		0.2										
Torque measuring system												
Nominal (rated) torque M_{nom}	N·m	0.1	0.2	0.5	1	2	5	10	20	50	100	200
Nominal (rated) sensitivity (nominal (rated) signal range between torque = zero and nominal (rated) torque)	V	10										
Sensitivity tolerance (deviation of actual output quantity at M_{nom} from nominal (rated) signal range)	%	± 0.2										
Output signal at torque = zero	V	0 ± 0.2										
Nominal (rated) output signal												
at positive nominal (rated) torque	V	+10										
at negative nominal (rated) torque	V	-10										
Load resistance	MΩ	> 1										
Long-term drift over 48 h	mV	< ± 50										
Cut-off frequency (-3 dB)	Hz	200										
Residual ripple	mV_{PP}	< 80										
Group delay	ms	< 1.0										
Temperature effect per 10 K in nominal (rated) temperature range												
on the output signal, related to the actual value of the signal span	%	± 0.1										
on the zero signal, related to the nominal (rated) sensitivity	%	± 0.2										
Power supply												
Nominal (rated) supply voltage (separated extra-low voltage (SELV))	V (DC)	12 (10.8 – 13.2)										
Calibration signal triggering	V	5 – 13.2										
Current consumption in measuring mode	A	< 0.2										
Nominal (rated) power consumption	W	< 2.4										
Max. ripple on supply voltage	mV_{pp}	200										
Non-linearity including hysteresis, related to nominal (rated) sensitivity	%	< ± 0.1										
Relative standard deviation of the repeatability per DIN 1319, related to the variation of the output signal	%	< ± 0.05										
Calibration signal	V	+10 ± 0.2%										
Measurement system for rotational speed/angle of rotation												
Measurement system		optical										
Pulses per revolution	Number	360										
Output signal	V	5 (asymmetrical); two square wave signals approx. 90° phase shifted										
Minimum rotational speed for sufficient pulse stability	min^{-1}	0										
Load resistance	kΩ	>10										
Group delay	µs	< 3 for 1.5 m cable between T20WN and junction box VK20A (without VK20A, the group delay is dependent on the connected impedance / cable & evaluating device)										
Max. measurable rotational speed	min^{-1}	3000										
General data												
EMC												
Immunity from interference (DIN EN50082-2)												
Electromagnetic field												
Housing	V/m	10										
Leads	V_{PP}	10										
Magnetic field	A/m	100										
Burst	kV	2/1										
ESD	kV	4/8										

Specifications – T20WN (continued)

General data												
Emission (EME) (EN55011)												
RFI voltage		Class B										
RFI field strength		Class B										
Degree of protection per EN 60529		IP40										
Weight, approx.	kg	0.17					0.34			0.6		
Nominal (rated) torque M_{nom}	N·m	0.1	0.2	0.5	1	2	5	10	20	50	100	200
Nominal (rated) temperature range	°C	+5 to +45										
Operating temperature range	°C	0 to +60										
Storage temperature range	°C	–5 to +70										
Impact resistance, test severity level per DIN IEC 68; Part 2-27; IEC 68-2-27-1987												
Number	n	1000										
Duration	ms	3										
Acceleration (half sine)	m/s^2	650										
Vibration resistance, test severity level per DIN IEC 68, Part 2-6: IEC 68-2-6-1982												
Frequency range	Hz	5 – 65										
Duration	h	1.5										
Acceleration (amplitude)	m/s^2	50										
Nominal (rated) rotational speed	min^{-1}	10 000										
Load limits [1]												
Limit torque, related to M_{nom}	%	200 [2]										
Breaking torque, related to M_{nom}	%	> 280										
Longitudinal limit force	kN	0.2	0.2	0.2	0.34	0.5	1.1	1.75	2.75	5.3	7.6	12.5
Lateral limit force	N	3.6	3.6	3.6	5.7	8.3	18.2	29	46	88	127	207
Limit bending moment	N·m	0.12	0.12	0.12	0.23	0.4	0.93	1.9	3.7	10	17	36
Oscillation width per DIN 50 100 (peak-to-peak) [3]	%	80										
Mechanical values												
Torsional stiffness c_T	kN·m/rad	0.03	0.03	0.03	0.05	0.07	0.91	1.9	3.25	14	21.9	32.6
Torsion angle at M_{nom}	deg.	0.2	0.38	0.96	1.1	1.7	0.32	0.3	0.35	0.2	0.26	0.35
Max. limits for relative shaft vibration (peak-to-peak) [4]	µm	$s_{max} = \frac{4500}{\sqrt{n}}$										
rms value for the vibration velocity of the enclosure designated in VDI 2056	mm/s	$v_{eff} = \frac{\sqrt{n}}{3}$										
Mass moment of inertia of the rotor (around rotary axis) with rotational speed measuring system ($x10^{-3}$)	gm^2	0.06	0.06	0.06	0.063	0.068	6.1	6.13	6.23	53.7	54.6	57.2
Balance quality level per DIN ISO 1940	–	G 6.3										

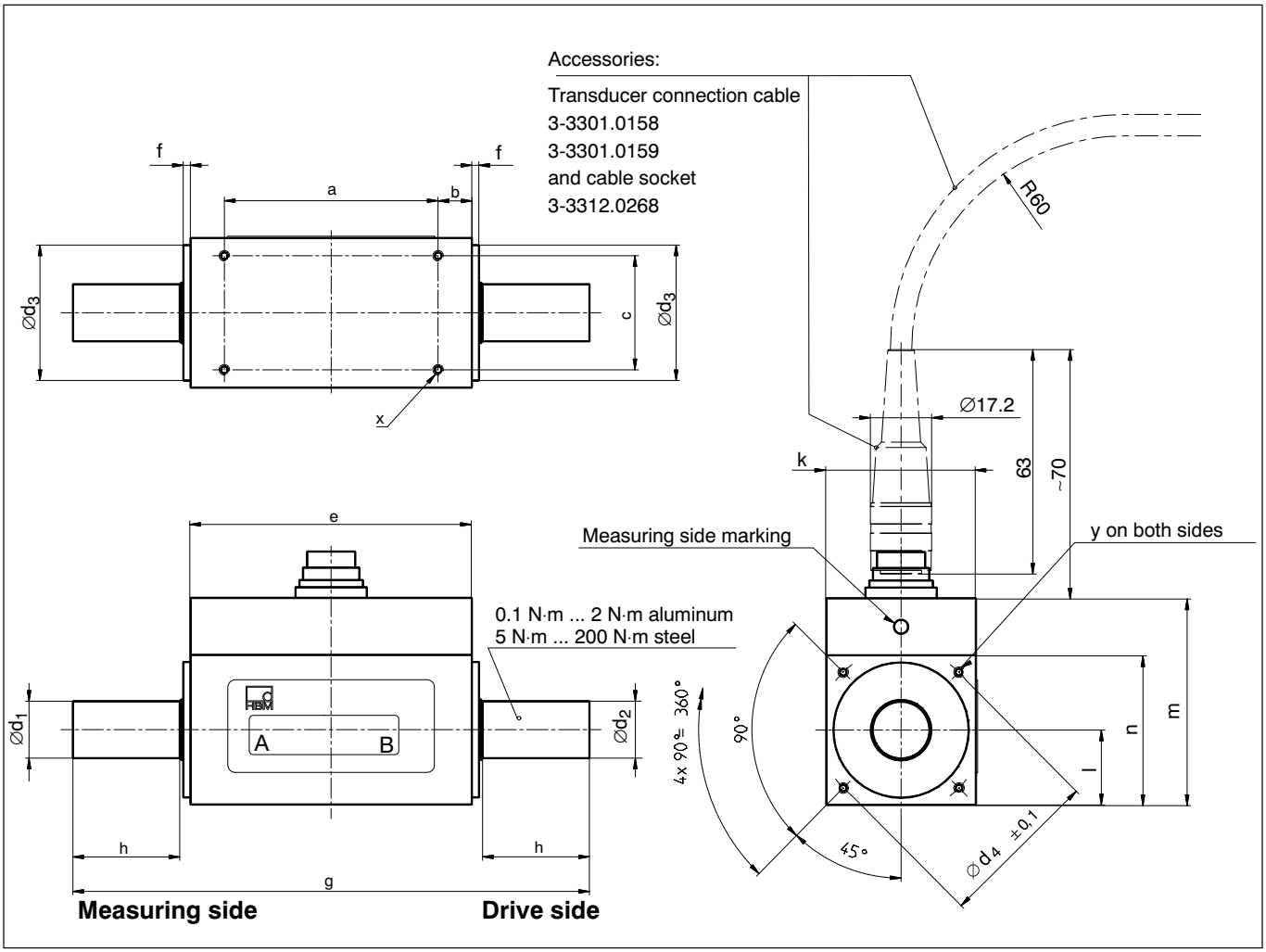
[1] Each type of irregular stress (bending moment, lateral or longitudinal force, exceeding nominal (rated) torque) can only be permitted up to its specified static load limit, provided none of the others can occur at the same time. If this condition is not met, the limit values must be reduced. If 30% of the limit bending moment and lateral limit force occur at the same time, only 40% of the longitudinal limit force is permissible and the nominal (rated) torque must not be exceeded. The permissible bending moments, longitudinal forces and lateral forces can affect the measurement result by approx. 1% of the nominal (rated) torque.

[2] Note the maximum moment (T_{Kmax}) of the coupling.

[3] The nominal (rated) torque must not be exceeded.

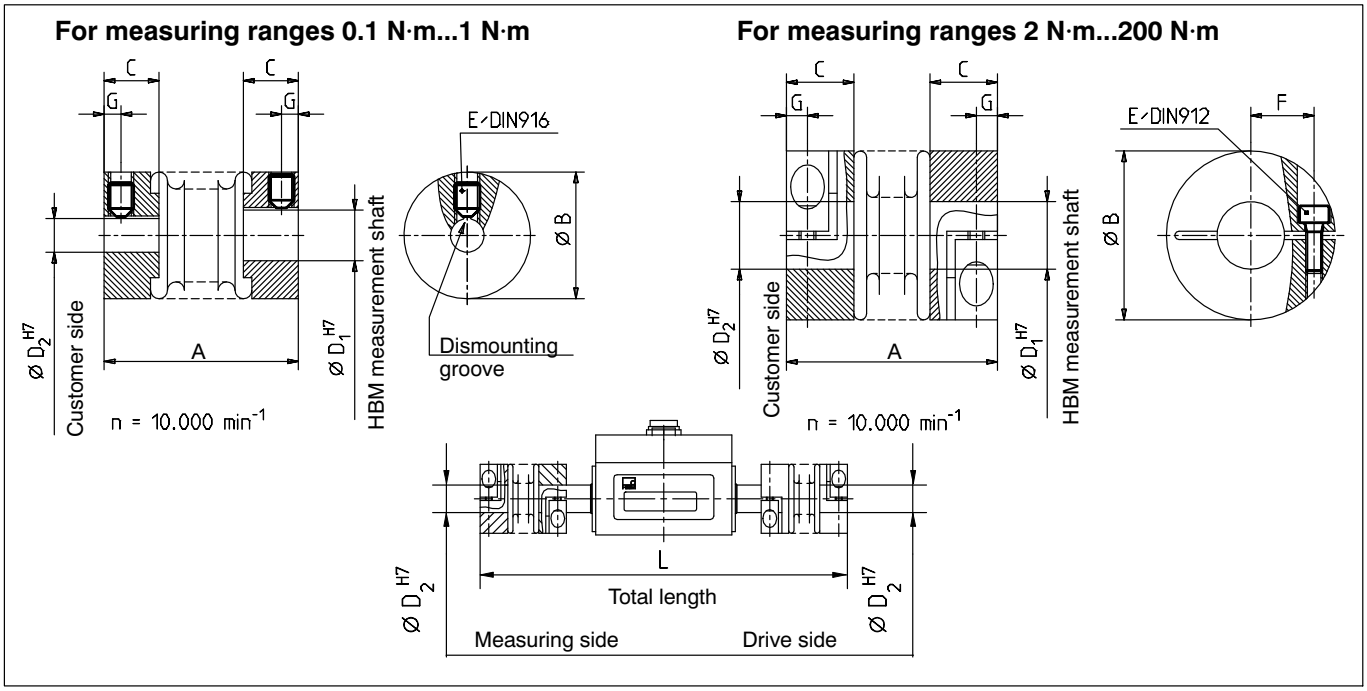
[4] Relative undulations, following DIN 45670/VDI 2059.

Dimensions – T20WN



Measuring range (N·m)	Dimensions in mm																
	a	b	c	$e_{\pm 1}$	f	g	h	$k_{\pm 1}$	l	$m_{\pm 1}$	n	$Ød1_{\ g6}$	$Ød2_{\ g6}$	$Ød3_{\ -0.1}$	$Ød4_{\ \pm 0,1}$	y	x
0.1	40	11	22	62	2	95	14	28	14	48.5	30	6	8	27	32	M3/6 deep	M3/5 deep
0.2	40	11	22	62	2	95	14	28	14	48.5	30	6	8	27	32	M3/6 deep	M3/5 deep
0.5	40	11	22	62	2	95	14	28	14	48.5	30	6	8	27	32	M3/6 deep	M3/5 deep
1	40	11	22	62	2	95	14	28	14	48.5	30	6	8	27	32	M3/6 deep	M3/5 deep
2	40	11	22	62	2	95	14	28	14	48.5	30	6	8	27	32	M3/6 deep	M3/5 deep
5	60	9.5	32	79	2	145	30	42	21	58	42	16	16	38	46	M3/6 deep	M3/6 deep
10	60	9.5	32	79	2	145	30	42	21	58	42	16	16	38	46	M3/6 deep	M3/6 deep
20	60	9.5	32	79	2	145	30	42	21	58	42	16	16	38	46	M3/6 deep	M3/6 deep
50	42	15	40	72	3	170	45	56	28	73	56	26	26	54	65	M4/8 deep	M4/8 deep
100	42	15	40	72	3	170	45	56	28	73	56	26	26	54	65	M4/8 deep	M4/8 deep
200	42	15	40	72	3	170	45	56	28	73	56	26	26	54	65	M4/8 deep	M4/8 deep

Bellows couplings



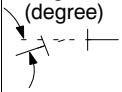
Dimensions

Measuring range (N·m)	Part no.	Dimensions in mm A	ØB	C	ØD1 Measuring side T20WN	ØD1 Drive side T20WN	ØD2 variable from-to	E	F	G	L
0.1	3-4412.0001	23_{-1}	15	6.5	6	8	3-9	M3	-	2	128
0.2											
0.5											
1	3-4412.0002	25_{-1}	15	6.5	6	8	3-9	M3	-	2	132
2	3-4412.0003	40_{-1}	25	13	6	8	3-12.7	M3	8	4	149
5	3-4412.0004	50_{-1}	40	16	16	16	5-22	M4	15	5	213
10											
20	3-4412.0005	69_{-2}	56	21	16	16	10-32	M6	19	7.5	241
50	3-4412.0006	80_{-2}	66	23.5	26	26	12-32	M8	23	9.5	283
100	3-4412.0007	93_{-2}	82	28	26	26	19-40	M10	27	11	300
200	3-4412.0008	109_{-2}	110	35	26	26	24-56	M12	39	13	318

When ordering, please specify: connection holes D_2 as requested by the customer within specified limits; boring tolerance H7.

When using with just **one** bellows coupling, specify the mounting side of the coupling:
Measuring side = 6 mm / **drive side = 8 mm**.

Specifications

Measuring range	Torque coupling T_{Kmax}	Mass moment of inertia	Weight	Torsional stiffness	Max. permissible offset			Spring stiffness		Material hub and mounting ring	Tightening torque for clamping bolts
(N·m)	(N·m)	(kg·cm$^{2)}$	(g)	(kN·m/rad)	axial (mm)	radial (mm)	angular (degree) 	axial (N/mm)	radial (N/mm)		(N·m)
0.1	0.5	0.012	6	0.21	0.5	0.2	1.5	13.4	47.7	Aluminum	0.35
0.2											
0.5											
1	1	0.018	7	0.38	0.5	0.2	1.5	27.4	84.3		0.75
2	2	0.27	38	1.3	0.6	0.2	1.5	20.6	88		0.75
5	10	1.6	120	9.05	1	0.2	1.5	33.3	389		1.5
10											
20	30	1.2	300	31	1	0.15	1.5	50	366		14
50	60	2.0	400	72	1.5	0.15	1.5	67	679		35
100	150	20	1600	141	2	0.15	1.5	77	960	Steel	75
200	300	40	3800	157	2	0.15	1.5	124	2940		120

General instructions

- Only tighten the clamping bolts of the couplings when the shafts are mounted in the coupling hubs!
- The bellows coupling must not be overstretched beyond the specified permissible flexibility limits.
- Drive and output shafts must be free from grease and burrs.
- Implement a tolerance of j6 for the shaft diameter, to produce the preferred fit of H7/j6.

Mounting position

The T20WN torque transducer can be operated with bellows couplings in any mounting position (horizontally, vertically or at an angle). When mounting vertically or at an angle, please make sure that the additional elements are adequately supported.

Condition at the time of delivery

The couplings and the torque transducer are delivered as separate items.

Accessories for the T20WN, to be ordered separately

Transducer connection cable, 5m long, order no. 3-3301.0158

Transducer connection cable, 10m long, order no. 3-3301.0159

Cable socket, 12-pin (Binder), order no. 3-3312.0268

Junction box, order no. 1-VK20A

Bellows couplings